8.0 QUALITY ASSURANCE PROJECT PLAN

This quality assurance project plan (QAPP) establishes the quality assurance (QA) objectives during the operation of the Colbert Landfill (landfill) remedial action (RA); the QA organization and procedures developed to meet QA and project objectives; the QA and quality control (QC) protocols and procedures associated with sampling and analysis of groundwater and treatment system influent/effluent; and data quality objectives (DQOs). The DQOs established for the project reflect the intended use of project data and, as such, prescribe the level of quality, accuracy, precision, completeness, comparability, and representativeness of data to be collected and analyzed. To assure quality data, this QAPP establishes specific procedures for sample collection and handling; sample custody; equipment calibration procedures and frequency; laboratory analytical procedures; data reduction, validation, and reporting; internal QC; performance and system audits; preventative maintenance; and data assessment procedures, corrective actions, and QA reports.

This QAPP addresses QA/QC requirements for the National Pollutant Discharge Elimination System (NPDES) discharge monitoring, which are interim requirements at this time. Revisions to this QAPP may be required at the end of the interim period, if the final NPDES discharge monitoring requirements vary from the interim requirements.

Guidance used for preparation of this QAPP is contained in various U.S. Environmental Protection Agency (EPA) documents, including *The Quality Assurance Manual for Waste Management Branch Investigations, Region X* (EPA 1986a); *A Compendium of Superfund Field Operations Methods (EPA/540/P-87/001)* (EPA 1987a); and other EPA (1979, 1981, 1982, 1983, and 1984a) and National Institute of Occupational Safety and Health (NIOSH 1988) guidance manuals and handbooks.

8.1 PROJECT OBJECTIVES

The primary objectives of remedial action activities are to operate a groundwater extraction, treatment, and discharge system that meets the performance requirements established in the Consent Decree.

Groundwater samples will be collected from compliance monitoring wells, extraction wells, and the RA treatment facility and analyzed for the Constituents of Concern and index parameters to evaluate compliance with the Consent Decree requirements, and for operational purposes.

The Consent Decree water quality criteria, and NPDES effluent limits, that are applicable during interim operation are shown in Table 8-1 and 8-2, respectively.

Groundwater and treatment system influent/effluent samples will also be collected during long-term Phase II operation.

8.2 PROJECT DATA QUALITY OBJECTIVES

The primary DQOs for activities are to obtain data of sufficient quality to provide a high degree of confidence in the data's precision, accuracy, representativeness, completeness, and comparability. The data will be used by EPA, Ecology, and the County to verify the effectiveness of the groundwater extraction, treatment, and discharge systems in meeting the requirements specified by the project Consent Decree, and the NPDES interim discharge requirements.

The project objectives can be achieved using data of analytical level III; that is, data from analyte-specific, non-Contract Laboratory Program (CLP) procedures, as described by EPA (1987c). Level III is consistent with the Consent Decree SOW requirements. Rigorous attention will be paid to QA/QC to assure (to the degree practicable) that analytical data will be of high quality.

The QA procedures presented in this document are developed to assure that the DQOs described above is met, as well as to assure that data generated are representative of treatment plant discharge water and groundwater conditions at the site. The overall goal of the project QA program is to assure a reasonable degree of confidence in data collected in support of groundwater extraction, treatment, and discharge systems operation; and in results of associated assessments through the establishment of a rigorous system of quality and performance checks on data collection, analysis, and reporting activities, as well as appropriate and timely corrective action to ensure compliance with established performance and quality criteria. To accomplish this goal, the following QA project objectives have been established:

- To establish, with the complete support of project management, a project QA function that is sufficiently independent of project technical activities, in order to assure appropriate levels of review and surveillance of project activities and data
- To establish and define the duties and responsibilities of personnel involved in QA activities
- To establish effective systems for project documentation to assure proper development, use, and review of the data
- To establish QA procedures that provide for sufficient objective evidence to verify that laboratory, field sampling, and other technical activities are performed in accordance with established technical procedures and requirements.

As previously discussed, this QAPP presents the procedures and methods for sampling and sample handling, sample chain-of-custody, instrument/equipment calibration, chemical analysis, internal quality control, auditing, and data assessment developed to meet project and QA objectives.

8.3 PROJECT QUALITY ASSURANCE ORGANIZATION AND RESPONSIBILITIES

Spokane County, through its Project Manager (Spokane County Project Manager), is responsible for assuring compliance with the provisions of this QAPP. The County may elect to contract with an appropriate firm or individuals to provide the QA organization and personnel required to assist the County in meeting the project QA responsibilities prescribed in this QAPP. While specific individuals with project QA responsibilities have not yet been identified, the QA organization will include, in addition to the Spokane County Project Manager, a Field Services Project Manager responsible for field and QA activities. If the County elects to conduct all QA activities internally, the Spokane County Project Manager and Field Services Project Manager positions could be combined. In addition, a separate QA Coordinator (QAC) and Laboratory QA Officer would need to be identified or contracted by the County.

The project QA organization, showing individuals with QA responsibility and lines of QA authority, is shown on Figure 8-1. Specific project QA responsibilities for the Field Services Project Manager, QAC, and Laboratory QA Officer are listed by responsible individuals in Table 8-3.

8.4 DATA QUALITY OBJECTIVES FOR PARCC PARAMETERS

The purpose of this section is to describe DQOs for precision, accuracy, representativeness, completeness, and comparability (PARCC) of project data. Specific procedures to be used for sampling, chain of custody, calibration, laboratory analysis, reporting, internal QC, audits, preventative maintenance, and corrective action are described in other sections of this QAPP. Detection limits are discussed in Section 8.8.

Samples will be analyzed in accordance with accepted analytical procedures selected from published methods contained in following documents: SW-846 *Test Methods for Evaluating Solid Waste*, Third Edition (EPA 1986b) and *Standard Methods for the Examination of Water and Wastewater*, Sixteenth Edition (APHA-AWWA-WPCF 1985).

Influent/effluent samples will be analyzed for selected chemical and physical parameters to assess system treatment effectiveness and compliance with project discharge requirements.

8.4.1 PRECISION AND ACCURACY

Precision is a measure of mutual agreement among individual measurements of the same property under prescribed conditions. It is expressed as a standard deviation or relative percent difference on laboratory and blind field duplicates. Accuracy is the degree of agreement of a measurement (or an average of measurements of the same property), X, with an accepted reference or true value, T. Accuracy can be expressed as the difference between the two values (X-T), the difference as a percentage of the reference or true value (100 (X-T)/T), or as a ratio (X/T). Accuracy is a measure of the bias in a system and will be expressed as the percent recovery of spiked samples and surrogates.

Accuracy and precision are determined through QC parameters such as surrogate recoveries, matrix spikes, matrix spike duplicates, laboratory duplicates, QC check samples, and blind field duplicates. The project DQOs for the evaluation of these parameters are based on those given in the method or on functional guidelines outlined by the EPA for evaluating inorganic and organic analyses (EPA 1988a,b; 1991). Project QC objectives for surrogate recovery control limits (expressed as a percent of recovery), and for matrix spikes and matrix spike duplicate control limits [expressed as a percent of recovery and relative percent difference (RPD)] are listed in Tables 8-4 and 8-5, respectively. Control limits listed in these tables are consistent with EPA guidelines contained in the specific methods. These control limits will be used as criteria for data acceptance. Specific control limits may be modified after selection of an analytical laboratory. If the required QC limit for replication or recovery is not met, corrective action will be performed by the laboratory following the guidelines presented in Section 8.14. If the corrective action is performed and QC objectives still are not met, the QAC will be notified by the laboratory prior to data submittal, so that additional corrective action can be taken, if appropriate. Such action may include reanalysis of the sample or other determination to be made by the QAC and the Field Services Project Manager.

In addition to matrix spikes and matrix spike duplicates, QC samples for verification of precision and accuracy include laboratory duplicates, QC check samples, and blind field duplicates (Section 8.10.1). Acceptance criteria are given in the referenced method and in Tables 8-4 and 8-5.

If results for the QC check samples, laboratory duplicates, or blind field duplicates are outside the control limits, corrective action and/or data qualification requirements will be determined on a case-by-case basis by the QAC. The matrix of the QC check samples may not match the field sample matrix, and blind field duplication can be poor due to sample

inhomogeneity. Therefore, corrective action will be determined by the QAC and discussed in the data QA report.

8.4.2 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represent an actual condition or characteristic of a population. Sample locations and field sampling procedures have been chosen to maximize representativeness. The degree of representativeness will be measured by repetitive measurements of the same parameter at the same sampling location over several distinct sampling events. The potential effect of seasonal variations and sampling on accuracy will also be considered with respect to representativeness.

8.4.3 COMPLETENESS

Completeness is a measure of the proportion of data specified in the sampling plan that is determined to be valid. The QA objective for completeness during this project will be 90 percent.

8.4.4 COMPARABILITY

Comparability is an expression of the confidence with which one data set can be compared to another. All measurements will be made so that results are consistent and representative of the media and conditions measured. All data will be calculated, qualified, and reported in units consistent with EPA guidelines. Method detection limits and units to be reported are described in Section 8.8 of this document.

8.5 SAMPLING PROCEDURES AND HANDLING

8.5.1 SAMPLING SITE SELECTION AND OBJECTIVES

As previously discussed, groundwater and influent/effluent samples will be collected during the interim discharge activities. Groundwater samples will be collected from compliance monitoring wells and extraction wells located proximate to contaminant plumes. Monitoring well and extraction well locations are shown on Figure 8-2. Influent and effluent samples will be collected from the intake and discharge (respectively) of the treatment system.

Groundwater samples collected from compliance monitoring wells and extraction wells will be analyzed for a limited number of volatile organics to evaluate interception system performance and operational settings, and evaluate compliance with the minimum functional standards (MFS)

specified in WAC 173-304-490. Samples from groundwater compliance monitoring wells will be analyzed for the six volatile organic compounds identified as the Constituents of Concern (1,1,1-TCA; 1,1-DCA; 1,1-DCE; TCE; PCE; and methylene chloride) once a year, and will be analyzed for a reduced list of parameters identified as the indicator compounds (1,1,1-TCA; 1,1-DCA; 1,1-DCE; and TCE) quarterly. Samples collected from extraction wells will be analyzed for the Constituents of Concern for each sample event at Spokane County's discretion. Six additional samples (four from the upper aquifer and two from the lower aquifer) will be analyzed for constituents listed in WAC 173-304-390(2)(d)(i) to satisfy MFS requirements.

Treatment system influent and effluent will be analyzed for volatile organics (full list of EPA Method 8010A compounds) to evaluate treatment system performance, and may be analyzed (at the County's discretion) for hardness and alkalinity to evaluate the effectiveness of scale control measures. Treatment system effluent samples will also be analyzed for NPDES parameters, including:

- Total phosphorous (as P)
- Nitrate and nitrite
- Chloride, iron, and manganese
- Chronic and acute fish bioassays
- pH, turbidity, conductivity, and temperature
- Algal growth potential (if necessary).

All groundwater and treatment system influent/effluent samples will also be analyzed (in the field) for pH, specific conductivity, turbidity, and temperature.

8.5.2 Sampling Procedures

Sampling procedures are presented in the field sampling plan (Appendix F to this O&M plan). Table 8-6 presents information on chemical analyses to be conducted, sample containers and sample preservation methods to be used, and maximum sample holding times.

8.5.3 Sample Documentation

Sample documentation will comply with procedures contained in Section 4.6 of *A Compendium of Superfund Field Operations Methods* (EPA 1987a). Project sampling and sample

handling will be documented through the use of the records summarized in Table 8-7. Examples of forms to be used for sampling activities are presented in the field sampling plan.

8.5.4 LABORATORY COORDINATION AND REPORTING

The analytical laboratory will perform chemical analysis of groundwater samples. The Project Field Representative will coordinate sampling activity with the laboratory to assure that all samples can be processed within the required holding times. (Actual holding times will be verified by review during data validation as described in Section 8.9).

8.6 SAMPLE CUSTODY

Strict chain-of-custody procedures will be followed on the project to maximize sample integrity and accountability. Sample control and chain-of-custody in the field and during transport to the laboratory will be conducted in accordance with procedures described in Section 4.0 of *A Compendium of Superfund Field Operations Methods* (EPA 1987a) and Section 4.1.10 of Appendix A. For sample shipments, a chain-of-custody form similar to that presented in the field sampling plan will be used. Sample control and custody at the laboratory through sample disposal will be conducted in accordance with procedures contained in the laboratory standard operation procedures (SOP) for organics and inorganics analysis.

When samples are transferred, the person relinquishing the samples will sign the Chain-of-Custody Form and record the date and time of transfer. The sample collector will sign the form in the first signature space.

Project documentation of sample custody will be verified by the QAC during regular review of the data validation package. Data validation is discussed further in Section 8.9.

8.7 CALIBRATION PROCEDURES AND FREQUENCY

8.7.1 LABORATORY INSTRUMENTS

Laboratory instruments will be calibrated and their performance evaluated in accordance with the methods cited in Section 8.12. Instrument performance for all other analyses will be evaluated against appropriate check standards and calibration blanks for each parameter prior to commencing actual analysis on each day the analysis is performed. Divergence from benchmark criteria (as defined in the above-cited methods) will be corrected prior to analysis.

For volatile organics analysis in water, the GC will be calibrated initially for each analyte with a five-point calibration using concentrations established according to guidelines in the method. Linearity must be established by a variation of less than 20 percent RSD in the calibration factor throughout the working range. The calibration will be verified each day using one or more calibration standards, and must vary less than 15 percent from the initial calibration. Continuing calibration will be performed throughout the day using a mid-level standard and will vary less than 15 percent from the initial calibration factors. Retention time windows will be established for each analyte according to Method 8010A. These retention time windows will be updated daily according to the method and all continuing standards must fall within the windows.

Guidance for instrument calibration is described for individual methods for organic and metal analytes in EPA (1986b) and for other inorganic analyses in EPA (1983).

After calibration and standardization of instrumentation are within acceptable limits, precision and accuracy will be evaluated by analyzing a QC check sample for each analysis performed that day. QC check samples containing all analytes of interest will be either purchased commercially or prepared from pure standard materials independently from calibration standards. The QC check sample will be analyzed and evaluated according to criteria in the method. Instrument performance check standards and calibration blank results will be recorded in a laboratory log book, which will also contain evaluation parameters, benchmark criteria, and maintenance information (see Section 11.0). Table 8-8 presents suggested QC check materials for laboratory analysis and for field equipment measurement parameters not addressed in the methods cited above.

8.7.2 FIELD INSTRUMENTS

Four field instruments (pH meter, conductivity meter, thermometer, and turbidimeter) will be used during the interim discharge period. The field meters will be calibrated (if applicable) in accordance with manufacturer's instructions, which are presented in the field sampling plan. QC limits for accuracy and precision of the field analyses are listed in Table 8-9.

Calibration results will be recorded in an instrument log book dedicated to each field instrument. This log book also will contain instrument preventive maintenance information, as appropriate.

8.8 ANALYTICAL PROCEDURES

The EPA methods have established detection limits (and, in some cases, quantification limits) covering each analyzed constituent for use nationwide as a contractual requirement for analytical laboratories. Quantification limits were established after considering typical ranges of interferences affecting quantification of constituents in representative environmental samples. Quantification of constituents at levels below the established quantification limits may be achieved if interferences are not significant. For highly contaminated samples, matrix effects may require higher quantification limits.

General methods and method quantification limits for analyses to be performed are summarized in Table 8-10. Methods for analysis will include analytical procedures, specified in Table 8-10, commonly employed by the project laboratory and verified as to accuracy and precision. QC checks and decision criteria for determining if an analysis is within laboratory and method QC requirements will follow the guidelines given in the laboratory SOP and/or QA plan or in the method, if available.

Where appropriate and consistent with anticipated data uses (and in recognition of the validation requirements), these procedures may be modified, with the concurrence of the QAC, to incorporate techniques familiar to the project laboratory. Deviations from EPA methods must be substantiated by full data verification and validation procedures according to requirements presented in the *EPA 530/SW-87/008 Test Method Equivalency Petitions Manual* (EPA 1987d). Any such procedure deviations deemed significant by the QAC will be submitted to the EPA and Ecology for review and concurrence prior to implementation.

Three types of bioassays may be performed on discharge or receiving waters, chronic bioassay, acute bioassay, and algal growth potential tests. The bioassays will be performed according to protocols in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, EPA-600-4-91-002, and *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, EPA/600/4-90/027F. The testing will be conducted on the following organisms, as specified in the substantive discharge requirements:

- Freshwater chronic toxicity test species fathead minnow: *Pimephales promelas*
- Chronic toxicity: rapid screening tests using *Ceriodaphnia dubia, Daphnia pulex,* and *Daphnia magna* (24-hour static test) method EPA/600-4-91-002

- Acute toxicity: Acute rapid screening tests using Duphnid (*Ceriodaphnia dubia*), *Duphia pulex, or Daphnia magna* (24-hour static test) method EPA/600/4-90/027F.

8.9 DATA REDUCTION, VALIDATION, AND REPORTING

All analyses performed for the project must be accompanied by sufficient QC results to enable reviewers to conclusively determine the quality of the data. The QAC or designee is responsible to the Field Services Project Manager for conducting checks for internal consistency, transmittal errors, laboratory protocols, and for complete adherence to the QC elements specified in this QAPP.

Field measurements (pH, conductivity, turbidity, and temperature) will be verified and checked through review of measurement and recording procedures during surveillance of field and instrumentation calibration procedures. Transfer of field data from field notebooks to raw data lists will be verified by the QAC.

Analytical data will be reported in the units specified in Table 8-10. These units have been selected to assure ease of comparison with previously generated relevant site data and human health criteria.

The laboratory will provide documentation including the sample results with appropriate annotations, and all QA/QC results associated with that sample set (method detection limits, blanks, laboratory duplicates, matrix spikes, matrix spike duplicates, laboratory control samples, and surrogate recoveries). Raw data will not be required for all samples; however, the laboratory will maintain this information in their files. Data validation procedures for all samples will include checking the following:

- Holding times
- Field trip blanks
- Field rinsate blanks
- Field transfer blanks
- Blind field duplicates
- Laboratory duplicates
- Laboratory matrix spikes
- Laboratory matrix spike duplicates

- Method blanks
- Surrogate recoveries
- Detection limits
- Assessment of precision
- Assessment of accuracy
- Assessment of completeness.

Section 8.13 presents statistical tests used to determine data precision, accuracy, and completeness. If precision or accuracy fall outside of established acceptance limits, reanalysis or corrective action will be implemented, as appropriate. All corrective action will be substantial and defensible, or the corrected data will not be used. Corrective action procedures are presented in Section 8.14.

8.10 INTERNAL QUALITY CONTROL

QC checks will consist of measurements performed in the field and laboratory. Analytical procedures referenced in Section 8.8 specify routine methods required to evaluate whether data are within proper QC limits. Additional QC checks include analysis of a number of field and laboratory QC samples, which are described in the following subsections.

8.10.1 FIELD/INTRALABORATORY METHODS

The following QC samples will be evaluated to verify accuracy and precision of analytical results for the project. The frequency of laboratory and field QC analyses is described herein.

8.10.1.1 Field Trip/Transfer Blank

The field trip/transfer blanks for water sampling will consist of deionized (DI) or distilled water in a volatile organic compound sample container (supplied by the analytical laboratory), which will be transported to the field, transferred to a new sample container in the field and returned to the laboratory for volatile organics analysis. One field trip/transfer blank will be included in each cooler containing water samples for volatile analysis.

8.10.1.2 Field Rinsate Blank

A minimum of 5 percent of the total number of non-QC groundwater samples collected using nondedicated sampling equipment will be collected and analyzed as field rinsate blanks. Field rinsate blanks will consist of DI or distilled water (supplied by the analytical laboratory) passed over and/or through decontaminated sampling equipment used to collect water samples. Surfaces and materials exposed during actual sampling will be rinsed to evaluate the effectiveness of sampling equipment decontamination procedures and potential for equipment or field cross contamination.

8.10.1.3 Blind Field Duplicate

The field duplicate for groundwater sampling will consist of two water samples collected sequentially. Samples will be coded such that the laboratory cannot discern from the sample label which samples are duplicates. A minimum of 5 percent of the total number of non-QC water samples collected will be analyzed for all analyses as blind field duplicates to provide information on the precision of chemical analysis.

8.10.1.4 Laboratory Matrix Spike

Laboratory matrix spikes will be conducted to provide information on accuracy and assure that extraction and concentration levels are acceptable. These analyses will be conducted on a minimum of 5 percent of non-QC groundwater samples (or one per sampling event, if fewer than 20 samples are obtained). The laboratory matrix spike will follow matrix spike guidelines specified in the laboratory SOP. Laboratory matrix spikes will be performed for all required analyses.

8.10.1.5 Laboratory Matrix Spike Duplicate

Laboratory matrix spike duplicates will be analyzed for a minimum of 5 percent of non-QC water samples (or one per sampling event if fewer than 20 samples are obtained). These analyses will be performed to provide information on the precision of chemical analysis. The laboratory matrix spike duplicate will follow matrix spike duplicate guidelines specified in the laboratory SOP. Laboratory matrix spike duplicates will be performed for all required organic analyses.

8.10.1.6 Laboratory Duplicates

Laboratory duplicates will be conducted on a minimum of 5 percent of all non-QC water samples to provide information on the precision of chemical analysis. Laboratory duplicates will be analyzed for all inorganic analyses.

8.10.1.7 Laboratory Method Blank

Laboratory method blanks will be analyzed for all analyses for a minimum of 5 percent of all non-QC water samples (or one per batch of samples analyzed, if fewer than 20 samples are analyzed) to assess possible laboratory contamination. Dilution water will be used whenever possible. Laboratory method blanks will contain all reagents used for analysis.

8.10.1.8 QC Check Sample

QC check samples containing each analyte of interest will be analyzed for a minimum of 5 percent of non-QC water samples or one per sampling event (if fewer than 20 samples are obtained) to verify the accuracy of laboratory equipment. Analysis will follow guidelines established in the EPA methods. Procedure calibrations will substitute for QC check samples where QC check samples are not required by the method.

8.10.2 INTERLABORATORY COMPARISONS

Interlaboratory comparisons are not planned at this time. A limited number of samples may be split with the EPA and/or Ecology, if requested.

8.11 PERFORMANCE AND SYSTEM AUDITS

This section presents the internal performance and systems audits required to monitor performance of the laboratory and field measurement systems. Performance and system audits of sampling activities and laboratory operations will consist of direct observations of work being performed, and inspection of laboratory and field equipment use, calibration, and maintenance to verify adherence to QA/QC requirements.

Internal audits of both field and laboratory activities will be conducted by the QAC or designee once within the first 6 months of operation, and once every 2 years thereafter. Field audits will be unannounced to assure representative performance of technical and QA procedures.

Laboratory audits will be scheduled to assure that project samples are being analyzed during the audit.

Checklists for both field and laboratory audits will be based on EPA's National Enforcement Investigation Center audit checklists (EPA 1984b) as presented in Forms 8-1 through 8-5 to this section. The audit will be conducted only by individuals that have no direct responsibilities for the activities being audited.

Prior to internal audits, the auditor(s) will meet with the audited party to define the scope of the audit. The physical audit will consist of reviewing audited activities, completing the checklist, and noting any nonconformances, deficiencies, and relevant observations. An exit review will be conducted with the audited party to notify them of preliminary audit findings.

The auditor or designee will prepare an audit report that includes findings, nonconformances, observations, recommended corrective action, and a schedule for completion of such action. An audit report format similar to that presented in Table 8-11 will be used.

For each identified nonconformance, a Corrective Action Report (Form 8-6) will be issued as part of the audit report by the auditor to notify the responsible party (the individual responsible for implementing corrective action) of the recommended corrective action and its schedule for completion (see Section 8.14). If a field corrective action is required, the Field Coordinator will be notified. If a laboratory corrective action is required, the Laboratory QA Officer will be notified. The audit report will be distributed to the Spokane County Project Manager and Field Services Project Manager.

The audit will remain open until all corrective action is completed by the responsible party and approved by the QAC. Once all findings are corrected and documented on Corrective Action Reports, the audit will be closed by the QAC. Closure may be effected by either a memo to be filed with the audit report or by another appropriate method. The audit reports and associated Corrective Action Reports will be submitted to Ecology and EPA once the audit is closed.

8.12 PREVENTIVE MAINTENANCE

8.12.1 FIELD INSTRUMENTS

The field representative is responsible for field instrumentation preventive maintenance for instrumentation utilized by that individual. Preventive maintenance on field instruments will be performed by qualified field technicians in accordance with manufacturer's instructions and

maintenance schedules. Maintenance will be documented in instrument log books and will include the date and initials of individual performing the maintenance.

The field representative will routinely compare instrument calibration results against preventive maintenance records to verify the effectiveness of the preventive maintenance program. The field representative is responsible for scheduling preventive maintenance required by the manufacturer.

8.12.2 LABORATORY INSTRUMENTS

The analytical laboratory manager has ultimate responsibility for maintaining laboratory instruments in good working order, including responsibilities for routine maintenance and the training of personnel in maintenance procedures. All maintenance activities and other appropriate details will be documented daily in maintenance log books by the laboratory personnel performing the maintenance. Each entry will be signed and dated. At a minimum, the preventative maintenance schedules contained in the equipment manufacturer's instructions will be followed.

8.13 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA

Analytical data will be reviewed to assure that the QA/QC objectives for precision, accuracy, and completeness are met. These reviews are intended to identify the occurrence of deficiencies in time to take corrective action. This section describes routine procedures for assessing project data.

8.13.1 ASSESSMENT OF PRECISION

Precision measures the mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. QA/QC sample types that test precision include field duplicates, laboratory duplicates, and laboratory matrix spike duplicates. The estimate of precision of duplicate measurements is expressed as a relative percent difference (RPD), and is calculated as follows:

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100$$

Where D_1 = First sample value

D_2 = Second sample value (duplicate)

The RPDs will be routinely calculated and compared with DQOs.

To set control limits, the standard deviation, s, of a series of replicate measurement limits is calculated:

$$s = \sum_{i=1}^{n} \left[\frac{(Xi - \overline{X})^2}{n-1} \right]^{1/2}$$

Where: s = the sample standard deviation

n = the number of replicates

Xi = the ith replicate

X = the mean of the replicates

8.13.2 Assessment of Accuracy

Accuracy is assessed using results of QC check samples and laboratory matrix spike analyses, and is routinely expressed as a percent recovery, which is calculated:

$$Percent\ Recovery = \frac{(Total\ Analyte\ Found - Analyte\ Originally\ Present) \times 100}{Analyte\ Added}$$

The percent recovery will be routinely calculated and checked against DQOs.

8.13.3 Assessment of Completeness

The amount of valid data produced will be compared with the total analyses performed to assess the percent of completeness. Completeness will be routinely calculated and compared with DQOs.

8.14 CORRECTIVE ACTIONS

Corrective actions may be needed for three categories of non-conformance:

- Deviations from the methods or QA requirements established in the QAPP
- Measuring or analytical equipment malfunctions
- Analytical error.

Corrective action procedures that might be implemented based on audit results; detection of unacceptable data are developed on a case-by-case basis. Such actions may include one or more of the following:

- Altering procedures in the field
- Using a different batch of containers
- Performing an additional audit of field or laboratory procedures
- Reanalyzing samples if holding times allow
- Resampling and analyzing
- Evaluating sampling and analytical procedures to determine possible causes of the discrepancies
- Accepting the data with no action, acknowledging the level of uncertainty
- Rejecting the data as unusable.

During field operations and sampling procedures, the field representative will be responsible for taking and reporting required corrective action related to field activities. A description of any such action taken will be entered in the field log book. If field conditions are such that conformance with the QAPP is not possible, the QAC will be consulted immediately. Any corrective action or field condition resulting in a major revision of the QAPP or field sampling plan will be communicated to the County Project Manager, as well as the EPA and Ecology, for review and concurrence. This communication will be made prior to changes in the field activities whenever possible.

During laboratory analysis, the Laboratory QA Officer will be responsible for taking required corrective actions in response to equipment malfunctions. If an analysis does not meet DQOs outlined in this QAPP, corrective action will follow the guidelines in the EPA methods and the EPA guidelines for data validation for organics and inorganics (EPA 1988a,b; 1991). At a minimum, the Laboratory QA Officer will be responsible for monitoring the following:

- Calibration check compounds must be within performance criteria specified in the EPA method or corrective action must be taken prior to initiation of sample analysis. For volatile organics analysis in water (Method 8010), a minimum of five calibration standards will be prepared for each analyte of interest. One of the standards should be at a concentration near, but above, the method quantification limit. The other concentrations should correspond to the expected range of concentrations found in real

samples or should define the working range of the detector. The percent relative standard deviation cannot exceed 20 percent when comparing calibration factors to determine if the five-point calibration curve is linear. The working calibration curve or calibration factor must be verified on each working day by the injection of one or more calibration standards. If the response for any analyte varies from the predicted response by more than ±15 percent, a new calibration curve must be prepared for that analyte. No analyses may be performed until these criteria are met.

- Before processing any samples, the analyst should demonstrate, through analysis of a reagent blank, that interferences from the analytical system, glassware, and reagents are within acceptable limits. Each time a set of samples is extracted or there is a change in reagents, a reagent water blank should be processed as a safeguard against chronic laboratory contamination. The blank samples should be carried through all stages of the sample preparation and measurement steps.

  For volatile organics analysis in water, blanks must contain less than 1.0 µg/L methylene chloride. The laboratory should report the methylene chloride concentration as estimated, "J," if below the 1.0 µg/L limit. For other parameters, method blanks must be below criteria guidelines specified in the method. If contaminants are present above these levels, the source of contamination must be investigated, corrective action taken and documented, and all samples associated with a contaminated blank reanalyzed. If, upon reanalysis, blanks do not meet these requirements, the QAC will be notified immediately to discuss whether analyses may proceed.

- Retention time windows will be defined by plus or minus three times the standard deviation of the absolute retention times for each standard. The laboratory must calculate retention time windows for each standard on each GC column and whenever a new GC column is installed. The data must be retained by the laboratory. All succeeding standards in an analysis sequence must fall within the daily retention time window established by the first standard of the sequence. No analyses may proceed until this criterion is met.

- Matrix spike analysis for volatile organics must be within the specified range for recovery limits or corrective action must be taken and documented. Corrective action includes: 1) reviewing calculations, 2) checking surrogate solutions, 3) checking internal standards, and 4) checking instrument performance. Subsequent action could include recalculating the data and/or reanalyzing the sample if any of the above checks reveal a problem. If the problem cannot be corrected through reanalysis, the QAC will be notified by the laboratory prior to data submittal, so that additional corrective action can be taken, if appropriate.

  If the recovery of a surrogate compound in the method blank is outside the recovery limits, the blank will be reanalyzed along with all samples associated with that blank. If the surrogate recovery is still outside the limits, the QAC will be notified immediately to discuss whether analyses may proceed.

- If holding times are exceeded, all positive and nondetected results will be qualified as estimated concentrations. If holding times are grossly exceeded, the QAC may determine the data to be unusable.

- If laboratory instrumentation deviates from required calibration specifications, the QAC will either flag data as estimated or determine it to be unusable, according to guidelines established by EPA (EPA 1988a,b; 1991).

If analytical conditions are such that nonconformance with this QAPP is indicated, the QAC will be notified as soon as possible, so that any additional corrective actions can be taken.

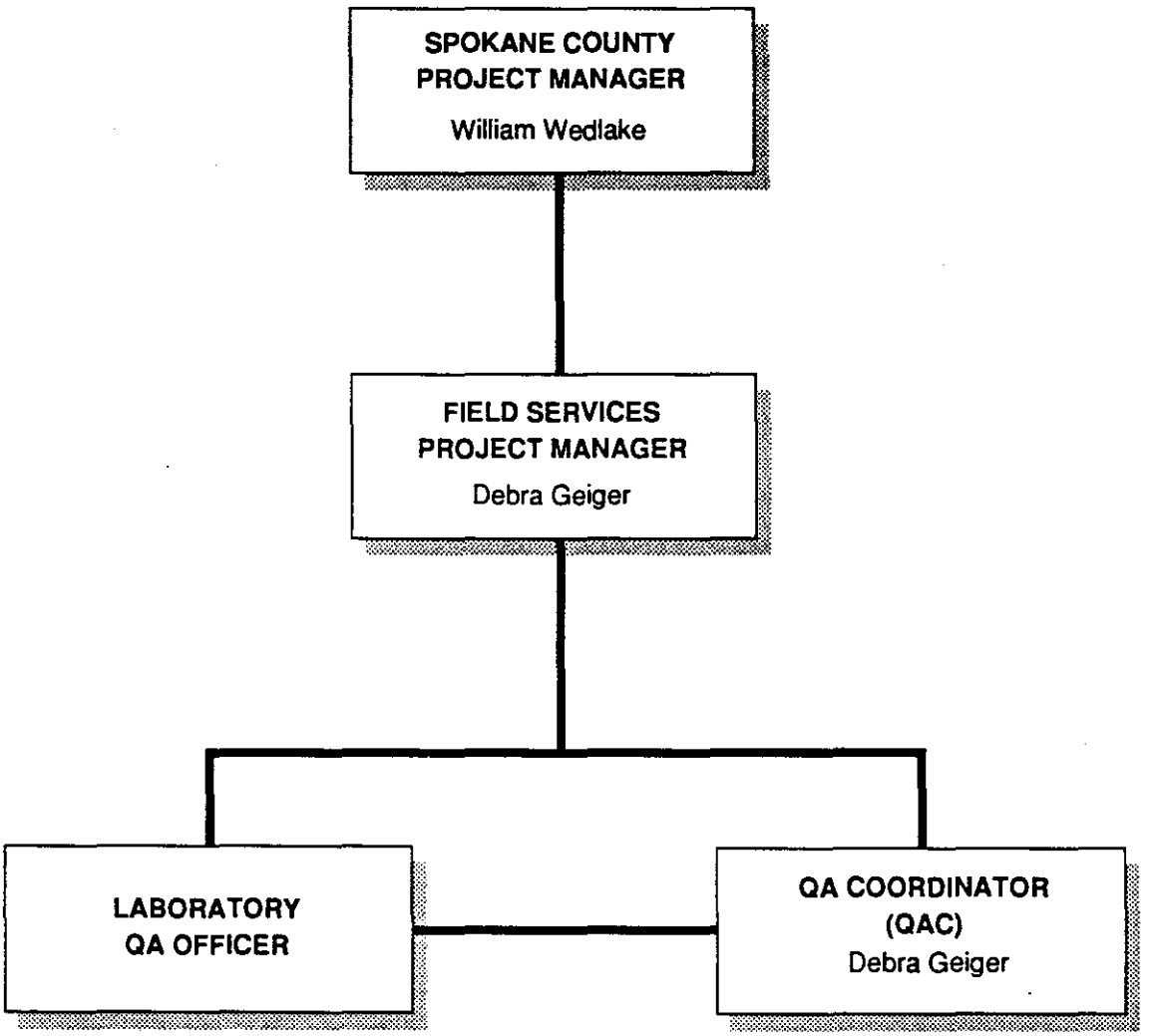
Corrective Action Reports (Form 8-6) will be used to document response to reported nonconformances. These reports may be generated from internal or external audits or from informal reviews of project activities (Section 8.11).

Corrective Action Reports initially will be reviewed for appropriateness of recommendations and actions by the QAC (for QA matters) and by the Project Manager (for technical approach). The reports will then be forwarded to the County Project Manager for review.

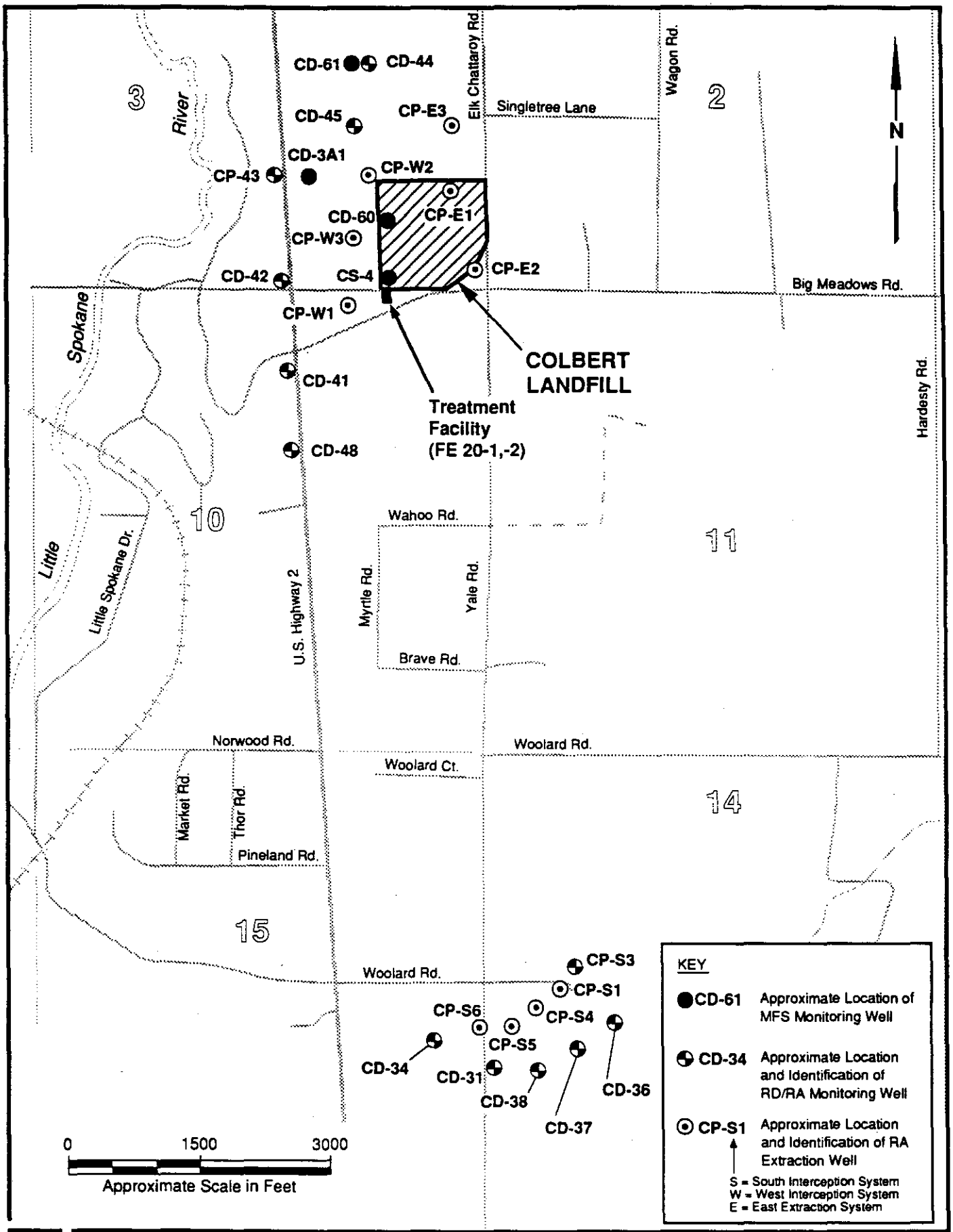
8.15 QUALITY ASSURANCE REPORTS TO MANAGEMENT

All data packages submitted to the EPA and Ecology will include a QA report containing results of the QA workups and conclusions. This QA report will summarize all relevant data quality information. The QAC will be responsible for data quality assessments and associated QA reports.

QA audit reports will be prepared and submitted to the Project Manager, the County Project Manager, and EPA. Final task or investigative reports will contain a separate QA section summarizing data quality information.



Project Quality Assurance Organization | Figure 8-1



124004.110 Spokane Co./Colbert Landfill/Operations & Maintenance Plan (M) 1/97

Extraction, Compliance, and MFS Monitoring Location Map

Figure 8-2

FIELD CHECKLIST

Field Observations

Yes__ No__ N/A__ 1. Was permission granted to enter and inspect the facility? (Required if RCRA inspection.)

Yes__ No__ N/A__ 2. Is permission to enter the facility documented? If yes, where is it documented?

Yes__ No__ N/A__ 3. Were split samples offered to the facility? If yes, was the offer accepted or declined?

Yes__ No__ N/A__ 4. Is the offering of split samples recorded? If yes, where is it recorded?

Yes__ No__ N/A__ 5. If the offer to split samples was accepted, were the split samples collected? If yes, how were they identified?

Yes__ No__ N/A__ 6. Are the number, frequency, and types of field measurements and observations taken as specified in the project plan or as directed by the project coordinator? If yes, where are they recorded?

Yes_ No_ N/A_ 7. Are samples collected in the types of containers specified for each type of analysis? If no, what kind of sample containers were used?

_____
_____
_____

Yes_ No_ N/A_ 8. Are samples preserved as required? If no or N/A, explain.

_____
_____
_____

Yes_ No_ N/A_ 9. Are the number, frequency, and types of samples collected as specified in the project plan or as directed by the project coordinator? If no, explain why not.

_____
_____
_____

Yes_ No_ N/A_ 10. Are samples packed for preservation when required (i.e., packed in ice, etc.)? If no or N/A, explain why.

_____
_____
_____

Yes_ No_ N/A_ 11. Is sample custody maintained at all times? How?

_____
_____
_____

FIELD CHECKLIST

Document Control

Yes_ No_ N/A_ 1. Have all unused and voided accountable documents been returned to the coordinator by the team members?

Yes_ No_ N/A_ 2. Were any accountable documents lost or destroyed? If yes, have document numbers of all lost or destroyed accountable documents been recorded, and where are they recorded?

Yes_ No_ N/A_ 3. Are all samples identified with sample tags? If no, how are samples identified?

Yes_ No_ N/A_ 4. Are all sample tags completed (e.g., station no., location, date, time, analyses, signatures of samplers, type, preservatives, etc.)? If yes, describe types of information recorded.

Yes_ No_ N/A_ 5. Are all samples collected listed on a chain-of-custody record? If yes, describe the type of chain-of-custody record used and what information is recorded.

Yes_ No_ N/A_ 6. If used, are the sample tag numbers recorded on the chain-of-custody documents?

Yes_ No_ N/A_ 7. Does information on sample tags and chain-of-custody records match?

Yes_ No_ N/A_ 8. Does the chain-of-custody record indicate the method of sample shipment?

Yes_ No_ N/A_ 9. Is the chain-of-custody record included with the samples in the shipping container?

Yes_ No_ N/A_ 10. If used, do the sample traffic reports agree with the sample tags?

Yes_ No_ N/A_ 11. If required, has a receipt for the samples been provided to the facility (required by RCRA)? Describe where offer of a receipt is documented.

Yes_ No_ N/A_ 12. If used, are blank samples identified?

Yes_ No_ N/A_ 13. If collected, are duplicate samples identified on sample tags and chain-of-custody records?

Yes_ No_ N/A_ 14. If used, are spiked samples identified?

Yes_ No_ N/A_ 15. Are logbooks signed by the individual who checked out the logbook from the project coordinator?

Yes_ No_ N/A_ 16. Are logbooks dated upon receipt from the project coordinator?

Yes_ No_ N/A_ 17. Are logbooks project-specific (by logbook or by page)?

Yes_ No_ N/A_ 18. Are logbook entries dated and identified by author?

Yes_ No_ N/A_ 19. Is the facility's approval or disapproval to take photographs noted in a logbook?

Yes_ No_ N/A_ 20. Are photographs documented in logbooks (e.g., time, date, description of subject, photographer, etc.)?

Yes_ No_ N/A_ 21. If film from a self-developing camera is used, are photos matched with logbook documentation?

Yes_ No_ N/A_ 22. Are sample tag numbers recorded? If yes, describe where they are recorded.

_____
_____
_____

Yes_ No_ N/A_ 23. Are calibration of pH meters, conductivity meters, etc., documented? If yes, describe where this is documented.

_____
_____
_____

Yes_ No_ N/A_ 24. Are amendments to the project plan documented? If yes, describe where the amendments are documented.

_____
_____
_____

FIELD CHECKLIST

Debriefing with Project Coordinator

Yes_ No_ N/A_ 1. Was a debriefing held with project coordinator and/or other participants?

Yes_ No_ N/A_ 2. Were any recommendations made to the project participants during the debriefing? If yes, list recommendations.

LABORATORY CHECKLIST

SIGNATURE OF AUDITOR _____ DATE OF AUDIT _____
LABORATORY _____ CEAT PROJECT NO. _____
LABORATORY LOCATION _____
CONTRACTS IN EFFECT _____

(List Contract Numbers)

1. Name of Sample Custodian and other personnel responsible for sample receipt and document control.

2. Where are the Sample Custodian's procedures and responsibilities documented?

3. Where are written Standard Operating Procedures (SOPs) pertaining to receipt of samples documented (laboratory manual, written instructions, etc.)?

4. Where is the receipt of chain-of-custody record(s) with samples being documented?

5. Review sample receipt documentation to assure that the nonreceipt of chain-of-custody record(s) with samples is being documented.

6. Where is the integrity of the shipping container(s) being documented [custody seal(s) intact, container locked or sealed properly, etc.]?

7. Review the sample documentation to assure that the lack of integrity of the shipping container(s) is being documented (i.e., evidence of tampering, custody seals broken or damaged, locks unlocked or missing, etc.).

8. Determine, by asking the Sample Custodian or reviewing the laboratory SOP manual, if agreement among Sample Management Office forms, chain-of-custody records, and sample tags is being verified? State source of information.

9. Where is the agreement or nonagreement verification being documented?

10. Review sample receipt documentation to assure that sample tag numbers are recorded by the Sample Custodian.

11. Where are written Standard Operating Procedures (SOPs) pertaining to the sample storage documented (laboratory manual, written instructions, etc.)?

12a. Do written SOPs and actual laboratory practices demonstrate laboratory security?

12b. Describe sample storage area (upright refrigerator in GC lab, walk-in cooler in sample receiving area, etc.).

13. How is sample identification maintained?

14. How is sample extract (or inorganics concentrate) identification maintained?

15. How are samples that require preservation stored to maintain their preservation?

16. How are written Standard Operating Procedures (SOPs) pertaining to sample handling and tracking documented?

17. What laboratory records are used to record personnel receiving and transferring samples in the laboratory?

18. Affirm that each instrument used for sample analysis (GC, GC/MS, AA, etc.) has an instrument log. List those instruments which do not.

19. Determine where analytical methods are documented and ask if methods are available to the analysts.

20. Determine where quality assurance procedures are documented and ask if procedures are available to the analysts.

21. How are written Standard Operating Procedures (SOPs) for compiling and maintaining sample document files documented?

22. How are sample documents filed (by case number, internal laboratory number, batch number, sample number, etc.)?

23. Review sample document files to determine if a document file inventory is prepared for each case file.

24. Review sample document files to determine if all documents in the case files are consecutively numbered according to the file inventories.

25. Observe the document file storage area to determine if the laboratory document files are stored in a secure area.

26. Has the laboratory received any confidential documents?

Complete questions 27, 28, and 29 ONLY if the response to question 26 was yes.

27. Review the case files to assure that confidential documents are segregated from other laboratory documents.

28. Review the case files to assure that confidential documents are stored in a secure manner.

29. Review recommendations from the previous audit to determine if the recommendations have been implemented. If not, the recommendations should be repeated and the laboratory director and the Project Officer should be notified.

LABORATORY CHECKLIST

Debriefing with Laboratory Personnel

1. List observations made by the auditor.

2. Make recommendations with respect to each observation.

3. Discuss observations and recommendations made by the auditor.

LANDAU ASSOCIATES, INC.

CORRECTIVE ACTION REPORT

Sample Program Identification: _____

Sampling Dates: _____

Material to be Sampled: _____

Measurement Parameter: _____

Acceptable Data Range: _____

_____

Corrective Actions Initiated By: _____

Title: _____ Date: _____

Problem Areas Requiring Corrective Action: _____

_____

_____

_____

_____

_____

Measures to Correct Problems: _____

_____

_____

_____

_____

Means of Detecting Problems (field observations, systems audit, etc.) _____

_____

_____

Approval for Corrective Actions: _____

Title: _____ Date: _____

Signature _____

TABLE 8-1

CONSENT DECREE WATER QUALITY CRITERIA[a]

Constituent of Concern	Performance Standard	Evaluation Criteria
1,1,1-Trichloroethane	200	200
Trichloroethylene	5	56
1,1-Dichloroethane	4,050	4,050
1,1-Dichloroethylene	7	7
Methylene chloride	2.5	25
Tetrachloroethylene	0.7	7

(a) Concentration in parts per billion (µg/L).

TABLE 8-2

NPDES EFFLUENT LIMITATIONS

Parameter	Average Monthly[a]	Maximum Daily[b]
Chloride	230 mg/L	
1,1-Dichloroethane		4,050 µg/L
1,1-Dichloroethylene		7 µg/L
Iron	300 µg/L	
Manganese	50 µg/L	
Methylene chloride		2.5 - 25 µg/L
Nitrates	10 mg/L	
pH		8.5
Total phosphorus		930 µg/L
Tetrachloroethylene		0.7[c] - 7[d] µg/L
1,1,1-Trichloroethane		200 µg/L
Trichloroethylene		5 µg/L

(a) The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
(b) The maximum daily effluent limitation is defined as the highest allowable daily discharge.
(c) Performance standard established in the ROD and Consent Decree.
(d) Evaluation criteria established in the Consent Decree.

TABLE 8-3

QUALITY ASSURANCE RESPONSIBILITIES

Personnel	Responsibilities
Field Services Project Manager	Coordinate technical project direction and product technical review; coordinate project/agency interaction; review project QA needs and approve appropriate QA corrective actions as needed; oversee technical project team performance to ensure successful accomplishment of technical and QA project objectives.
Project QA Coordinator (QAC)	Provide technical QA assistance; direct implementation of QAPP; arrange contract and other external procurement packages for QA needs; prepare corrective action response; prepare and submit QA reports to project management; conduct or supervise laboratory and field audits.
Laboratory QA Officer	Ensure that all laboratory QA objectives are met and laboratory QA/QC information is properly documented and reported.

TABLE 8-4

SURROGATE RECOVERY CONTROL LIMITS IN WATER SAMPLES

Surrogate Name	Control Limits (percent)[a]
Volatile Organics (8010A)	
Bromofluorobenzene	67 - 130
Bromochloromethane	62 - 138

(a) Surrogate selection and control limits may be revised after selection of analytical laboratory.

TABLE 8-5

LABORATORY MATRIX SPIKE/MATRIX SPIKE DUPLICATE CONTROLS IN WATER SAMPLES

Parameter	Recovery (percent)	RPD[(a)] (percent)
Volatile Organics Analysis (8010A)		
1,1-Dichloroethylene	61 - 145	20
Trichloroethylene	71 - 120	20
1,1,1-Trichloroethane	20 - 160	50
1,1-Dichloroethane	20 - 160	50
Methylene chloride	20 - 160	50
Tetrachloroethylene	20 - 160	50
Metals (6010/7000)	70 - 125	20
Other Inorganics		
Chloride, nitrate, nitrite, ammonia, total phosphorus, sulfate	75 - 125	20

(a) RPD = relative percent difference.

TABLE 8-6

SAMPLE CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

Analysis	Sample Container[a]	Preservation	Holding[b] Time
Volatile organic compounds	40 mL glass vials (leave no headspace, Teflon-lined septum cap	Maintain on ice	14 days
Total organic carbon	polyethylene or glass	cool to 4°C, H_2SO_4 to pH<2	28 days
Chemical oxygen demand	polyethylene or glass	cool to 4°C, H_2SO_4 to pH<2	28 days
Total coliform	polyethylene	cool to 4°C, chloride stabilizers	24 hours
Metals (dissolved)			
Zinc, iron, manganese	polyethylene	HNO_3 to pH<2	6 months
Metals (total			
Iron, manganese	polyethylene	HNO_3 to pH<2	6 months
Other Inorganics			
Nitrate + Nitrite, and Ammonia as N	polyethylene	cool to 4°C, H_2SO_4 to pH<2	28 days
Nitrite, Nitrate	polyethylene	None	48 hours
Chloride	polyethylene	Cool to 4°C	28 days
Sulfate	polyethylene	cool to 4°C, H_2SO_4 to pH<2	28 days
Total phosphorus	polyethylene	cool to 4°C, H_2SO_4 to pH<2	28 days
Toxicity (acute and chronic)	2½-gallon plastic cubileter containers	Cool to 4°	36 hours
Algal growth potential	glass, Teflon-lined cap	Cool to 4°C	36 hours

(a) Sample container specifications may be modified after consultation with the analytical laboratory.

(b) Holding times are from date of collection. All samples will be shipped to the laboratory within 24 hours (except as noted for samples collected on Friday). Arrangements will be made with the laboratory for timely receipt of samples with short holding times.

TABLE 8-7

SAMPLING AND SAMPLE HANDLING RECORDS

Record	Use	Responsibility/Requirements
Field Log Book	Record significant events, observations, and measurements	Maintained by sample collector; must be bound; all entries factual, detailed, and objective; entries must be signed and dated.
Sample Collection Form	Provide a record of each sample collected (Appendix B)	Completed, dated, and initialed by sample collector; maintained in project file
Sample Label	Accompanies sample; contains specific sample identification information	Attached to sample container by analytical laboratory and completed by sampler
Chain-of-Custody Seal	Seals sample shipment container to prevent tampering or sample transference (Appendix B)	Completed, signed, and applied by sample collector at time samples are transported
Chain-of-Custody Record	Accompanies samples, provides record of samples for custody from field to disposal of sample	Completed and signed by sample collector before relinquishing custody; must be signed by person accepting custody; must accompany samples at all times
Sample Analysis Request Packing List	Provides a record of each sample number, date of collection/transport, sample matrix, analytical parameters for which samples are to be analyzed, and condition of samples on receipt at laboratory (Appendix B)	Completed by sample collector at time of sampling transport; carbonless copies distributed to laboratory (copy 2) and project file (copy 1)

TABLE 8-8

INSTRUMENT PERFORMANCE CHECK MATERIALS AND FREQUENCY

Parameter	Check Material[a]	Frequency
Laboratory Analysis		
Chloride	Commercially prepared[b] standard solution	Daily or every 20 samples[c]
Nitrate	Commercially prepared standard solution	Daily or every 20 samples
Nitrite	Commercially prepared standard solution	Daily or every 20 samples
Ammonia	Commercially prepared standard solution	Daily or every 20 samples
Hardness	Commercially prepared standard solution	Daily or every 20 samples
Alkalinity	NA	NA
Total phosphorus	Standardized curvettes	Once per year
Sulfate	NA	NA
Field Measurement		
pH (meter)	pH 4, 7, 10 standard buffer solution	Minimum of every 4 hours of field use
Conductivity	KCl standard solution	Minimum of every 4 hours of field use
Temperature	National Bureau of Standards thermometer	Minimum of every 6 months
Turbidity		Minimum of every 4 hours of field use

NA = Not Applicable

(a) Check materials are subject to change based on actual preliminary instrument qualifying results.

(b) Standard solution may also be prepared by the laboratory independently from calibration solutions.

(c) Whichever is greater; daily is defined as every day the analysis is performed.

TABLE 8-9

FIELD ANALYSIS QUALITY CONTROL LIMITS

Parameter	Units	Accuracy	Precision
pH unit	Standard pH units	±0.1 pH unit	±0.1 pH unit
Specific conductivity	µmhos/cm	±5%	±5%
Temperature	°C	±0.1°C	±0.1°C
Turbidity	NTU	±5%	5%

TABLE 8-10

METHODS AND QUANTIFICATION LIMITS FOR ANALYSIS OF GROUNDWATER

Analyte	Analysis Method	Quantification Limit
Volatile Organics	EPA 8010A[a]	(µg/L)
Dichlorodifluoromethane		--
Chloromethane		0.8
Vinyl chloride		1.8
Bromomethane		3.0
Chloroethane		5.2
Trichlorofluoromethane		--
1,1-Dichloroethylene[b]		1.3
Methylene chloride[b]		2.5
trans-1,2-Dichloroethylene		1.0
1,1-Dichloroethane[b]		0.7
Chloroform		0.5
1,1,1-Trichloroethane[b]		0.3
Carbon tetrachloride		1.2
1,2-Dichloroethane		0.3
Trichloroethylene[b]		1.2
1,2-Dichloropropane		0.4
Bromodichloromethane		1.0
trans-1,3-Dichloropropylene		3.4
1,1,2-Trichloroethane		0.2
Tetrachloroethylene[b]		0.3
Chlorodibromomethane		0.9
Chlorobenzene		2.5
Bromoform		2.0
1,1,2,2-Tetrachloroethane		0.3
1,3-Dichlorobenzene		3.2
1,4-Dichlorobenzene		2.4
1,2-Dichlorobenzene		1.5
Benzyl chloride		--
Bromobenzene		--
2-Chloroethyl vinyl ether		1.3
Dibromomethane		--
1,1,1,2-Tetrachloroethane		--
Trichloropropane		--
Metals (total)		(µg/L)
Iron	EPA 6010	100
Manganese	EPA 6010	15
Metals (dissolved)		(µg/L)
Iron	EPA 6010	100
Manganese	EPA 6010	15
Zinc	EPA 6010	20

TABLE 8-11

AUDIT REPORT FORMAT

1. Purpose of audit
2. Audit basis
3. Time and place of audit
4. Personnel contacted
5. Audit team members
6. Summary of events
7. Findings and recommendations
   a. Positive findings
   b. Negative findings
8. Required follow up (responsible parties, summary of required corrective action, date of re-audit, if required)
9. Distribution of audit report and corrective action reports